

# Centripetal Force

Name: \_\_\_\_\_ Section: 2AL-\_\_\_\_ Date performed: \_\_\_\_/\_\_\_\_/\_\_\_\_

Lab station: \_\_\_\_\_ Partners: \_\_\_\_\_

## Determining the mass of the rotating object experimentally

(Q-1) Measure the angular speed of the rotor.

Trial	Counter readings (rev)		Number of revolutions (rev)	Elapsed time (s)	Angular speed (rev/s)
	Before	After			
1					
2					
3					
4					
5					
6					

Use Rule 8 in “Measurement and Calculation” to calculate the best value for the angular speed and its uncertainty.

$$N/t = (\text{_____} \pm \text{_____}) \text{ rev/s}$$

(Q-2) Find the centripetal force.

Mass needed to stretch spring by the same amount as in (Q-1).

$$M_{\text{low}} = \underline{\hspace{2cm}} \text{ kg} \quad M_{\text{high}} = \underline{\hspace{2cm}} \text{ kg}$$

How large is the range of possible values of  $M$ ? Why do you suppose it is as high as it is?

Based on your data above, calculate the centripetal force with its uncertainty (use Rule 8 again).

$$F_c = (\underline{\hspace{2cm}} \pm \underline{\hspace{2cm}}) \text{ N}$$

(Q-3) With the spring still stretched by the hanging weight in (Q-2), measure the radius of the circular path followed by the rotating mass.

$$r = (\underline{\hspace{2cm}} \pm \underline{\hspace{2cm}}) \text{ cm}$$

(Q-4) Calculate  $m_{\text{exp}}$ , including its uncertainty.

$$m_{\text{exp}} = (\underline{\hspace{2cm}} \pm \underline{\hspace{2cm}}) \text{ kg}$$

## Comparing to the known value of the mass

(Q-5) Determine  $m_{\text{known}}$  and compare to  $m_{\text{exp}}$ .

Which mass are you using?

A B C D E F G H I J K L M

$m_{\text{known}} = \underline{\hspace{2cm}} \text{kg}$

Compare  $m_{\text{exp}}$  and  $m_{\text{known}}$  using the discrepancy test.

Do they agree? Explain.

## Exercises

Upon what body does the centripetal force act in this experiment?

- (A) The motor.
- (B) The pointer.
- (C) The spring.
- (D) The mass connected to the spring.
- (E) The rotor head.

What part of the apparatus exerts the centripetal force?

- (A) The motor.
- (B) The pointer.
- (C) The spring.
- (D) The mass connected to the spring.
- (E) The rotor head.

How is the centripetal force determined?

- (A) It is calculated from the spring constant and the radius  $r$ .
- (B) It is calculated from the spinning mass  $m$ , the radius of its orbit  $r$ , and its velocity  $v$ .
- (C) It is measured by hanging a suspended weight which will stretch the spring by the proper amount.
- (D) The instructor has the value.
- (E) The centripetal force is not needed for this lab.